

## Skulls of the Blaauwbok *Hippotragus leucophaeus*

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The recent history of the Blaauwbok, *Hippotragus leucophaeus* (Pallas, 1766), an antelope from the southern tip of Africa which had become extinct by about 1800, was recounted by MOHR (1967), who listed all specimens in museum collections which are plausibly attributable to the species. KLEIN (1974) attributed subfossil remains, mainly teeth, to *H. leucophaeus*, showing that in the early Holocene it ranged much further east and northwest along the southern African coast. BOSSCHA ERDBRINK (1988) gave notes on the species in the course of discussions on fossil relatives; and ROOKMAAKER (1992) presented a revised list of specimens attributed to it in the world's museums.

Among the (pathetically few) specimens in collections, there are only two complete skulls: one in the Hunterian Museum, Glasgow (identified as *H. leucophaeus* by the noted palaeontologist ROBERT BROOM in a letter published by MOHR (1967), and one in the Zoological Museum, Amsterdam (identified by BOSSCHA ERDBRINK, 1988). KLEIN (1974) disputed MOHR's attribution of the Glasgow skull to this species, arguing that it is more probably the skull of the closely related sable antelope, *Hippotragus niger* (Harris, 1838).

The authentication of even one skull of this extinct antelope would be a significant event. We here compare the measurements of the Glasgow and Amsterdam skulls with those of numerous specimens of the two congeneric species.

One of us (CPG) measured specimens in European museums of the two living species of the genus *Hippotragus*: the sable antelope, *H. niger* (Harris, 1838) and the roan antelope, *H. equinus* (Desmarest, 1804). The intended study of geographic variation in these two wide-ranging species has up to now been somewhat delayed; so far only one publication has resulted (GROVES 1983).

The measurements taken were as follows:

Greatest skull length; condylobasal length; biorbital width (widest, i. e., on lower orbital rims); maxillary toothrow length (alveolar); maxillary premolar row length (alveolar); mandibular toothrow length (alveolar); mandibular premolar row length (alveolar); length of orbital rim occupied by lacrimal bone; width across horn bases; width of one horn base.

The Amsterdam skull (ZMA 18.623), reputed to be that of a blaauwbok, was measured by CPG in the same manner as the skulls of the two extant species, and a few extra measurements were kindly taken by Dr P. J. H. VAN BREE (in litt., 29. IV. 77). Measurements of the Glasgow skull were kindly provided by Ms. E. MACARTNEY, Museum Officer of the Hunterian Museum (in litt. 27. IV. 77). All measurements were entered into a datafile by CRW.

*H. niger* and *H. equinus* skulls were discriminated, sexes separately, using SPSS-DISCRIMINANT ("Direct" method) on the MICOM computer at the Australian National University. The measurements of the putative *H. leucophaeus* skulls were entered as unknowns.

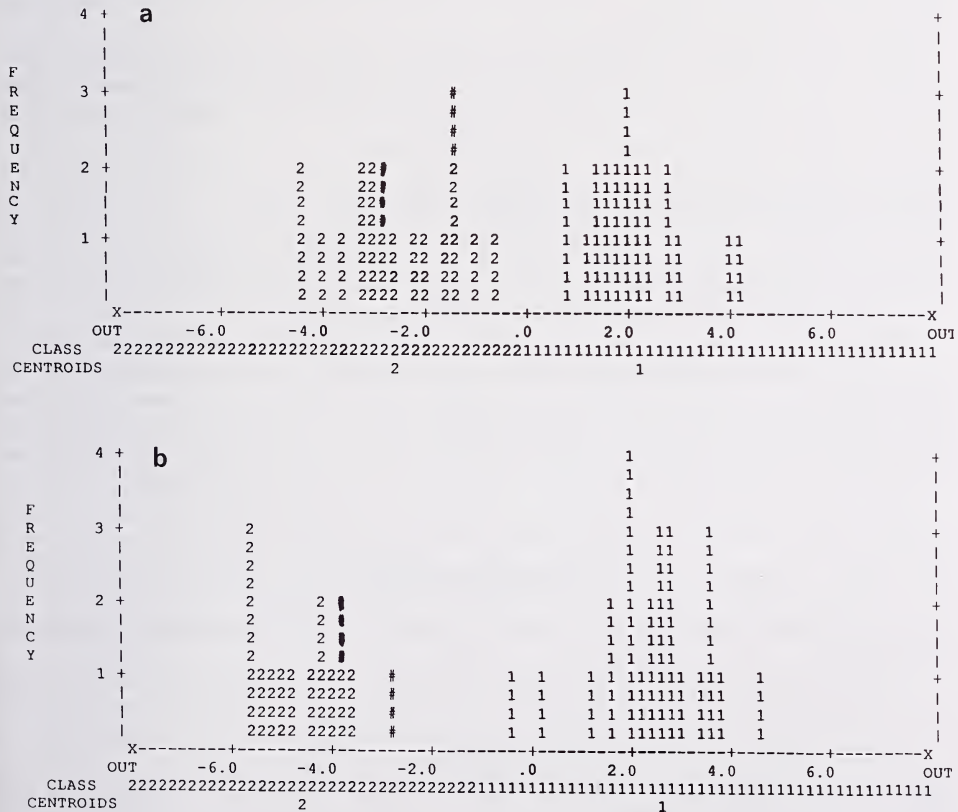
Skulls of *H. niger* and *H. equinus* separated totally using Discriminant Analysis (Fig. 1). Although there is a difference in size – roan are bigger than sable – this was not the main discriminator; instead, in the case of both males and females, premolar row length and biorbital width provided the greatest discrimination, while the horn base measurements provided none (Tab. 1).

When the two putative blaauwbok skulls are considered as males (Fig. 1 a), they turn out to be indistinguishable from sable antelopes. When they are entered into the female analysis, however, the Glasgow skull falls within the sable antelope range, though towards one edge; but the Amsterdam skull falls outside it (Fig. 1 b).

Accordingly, it appears that the Glasgow skull could, as argued by KLEIN (1974), be that of a sable antelope (although it need not be), while the identity of the Amsterdam skull depends on what sex it is.

As recorded by BOSSCHA ERDRINK (1988), the Amsterdam skull had previously been identified as female by Dr P. J. H. VAN BREE “because of its comparatively small size” (p. 144); but BOSSCHA ERDRINK, basing himself on the strong wear of the upper surface of the horns, considered it as more likely to be a male.

The Amsterdam skull measures 400 mm in greatest length; the Glasgow skull, 396 mm. Adult male skulls of *H. niger* range from 387 to 447 mm (the giant Angolan sub-



**Fig. 1.** Discriminant function analysis of *Hippotragus* skulls. (a) Males. (b) Females. Key: 1 = *H. equinus*, 2 = *H. niger*, # = Amsterdam skull, I = Glasgow skull.

**Table 1.** Correlations between original skull measurements and Discriminant Functions.

	(a) Males	(b) Females
Greatest skull length	0.20921	0.28232
Condylbasal length	0.28118	0.31026
Biorbital width	0.54279	0.47218
Width across horn bases	0.12920	-0.02876
Width of left horn base	-0.08095	-0.07747
Lacrimal on orbit	0.41353	0.14637
Maxillary tooththrow	0.37955	0.40722
Maxillary premolars	0.52348	0.52633
Mandibular tooththrow	0.51729	0.30903
Mandibular premolars	0.55927	0.30128

species, *H. n. variani*, excepted); only 3, out of 51 measurable skulls, are smaller than the Amsterdam skull, and 2 smaller than the Glasgow skull. Adult female skulls of the same species range from 376 to 444 mm, 4 out of 30 being as small as the Amsterdam and Glasgow skulls or smaller. If they were skulls of *H. niger*, both would therefore be small specimens whichever sex they were. It can be noted that only one skull (a female) of *H. equinus* is as small as 400 mm.

Horn wear resulting in flattening of the anterior surface is more usual in males, but it can be found in both sexes, contra BOSSCHA ERDRINK (1988). On the other hand, in both *H. niger* and *H. equinus* males' horns are longer and thicker than females. In the present study, the width of a single horn base varies as follows:

*H. niger*, males 43–60 mm (n = 68), females 37–54 mm (n = 35)

*H. equinus*, males 45–67 mm (n = 149), females 33–51 mm (n = 85)

There is, therefore, strong sexual dimorphism, but little difference between the two species. The Amsterdam skull's left horn core width is 39, the Glasgow skull's is 36. Both are evidently females on this evidence, and very small ones at that.

There is finally the evidence of horn shape itself. In juveniles and subadults of both sexes of the two living species, the horns curve evenly up and back, and the tips point backward; the horns cease growing in the female, but in the male they continue to elongate, curving down as they do so. The blaauwbok appears to have been the same: the two fully adult males among the four known mounted blaauwbok specimens, the Leiden and Paris specimens (MOHR 1967), both show the typically male downpointing tips, the Leiden one more than the Paris one (which is smaller and perhaps younger), whereas the only known female, the Vienna specimen (MOHR 1967), has back-pointing tips, and the horns also appear to be rather thin. The Amsterdam skull (BOSSCHA ERDRINK 1988; ROOKMAAKER, 1992) clearly shows the female condition, and the Glasgow skull (MOHR 1967) appears to as well, although only the cores are preserved: both, it should be specified, are fully mature.

Consequently, there can be little doubt but that both Amsterdam and Glasgow skulls are female, and that figure 1 b is relevant. In that diagram, the Amsterdam skull is outside the range of both sable and roan, and by process of elimination would most plausibly be a blaauwbok. Although the Glasgow skull falls within the sable range, it is not too distant from the Amsterdam skull either; we cannot *a priori* exclude the possibility that this could be a blaauwbok as well.

On the basis of the Glasgow skull, ROBERT BROOM distinguished *H. leucophaeus* from its living relatives as having more slender, downpointing premaxillae and a correspond-

ingly downcurved mandibular incisor region, and “the angle made by the nasal with the front of the supra-orbital part of the frontal is less obtuse” (MOHR 1967), although in the photos this angle would seem, if anything, *more* obtuse! MOHR (1967) notes the shortness of the distance along the orbital border which is occupied by the lacrimal bone, and that the horn cores, while long-oval as in *H. niger*, are flattened on their median surfaces rather than on the lateral as in the latter. Does the Amsterdam skull show similar features?

The premaxillae of the Amsterdam skull certainly appear slender, but are by no means as downpointing, nor is the mandibular incisor region as downcurved, as in the Glasgow skull. It is also worth noting that the premaxillae of the Leiden mounted specimen, extracted from the skin, appear slender (no measurements were taken by CPG) but show no signs of being downpointing. The supraorbital slope seems comparable with that of the Glasgow skull, but we are not convinced that this is a consistent character. The horn-core character is the same as in the Glasgow skull, and indeed was the means by which BOSSCHA ERDBRINK (1988) first identified the Amsterdam skull as blaauwbok.

The lacrimal bone in the Glasgow skull occupies only 15 mm of the orbital rim; this is equal to the smallest value in any sable antelope skull (values are higher in roan). In the Amsterdam skull this measurement is 12 mm. There may therefore well be a specific character here.

MOHR (1967) gives the upper premolar row length for the Glasgow skull as 36 mm (left), 35 mm (right), but KLEIN (1974) doubts this, suggesting that a mistake has occurred and that 46 and 45 mm are more likely. Ms E. MACARTNEY (in litt. to CPG, 27th April, 1977) confirms that this is the case, giving 45 mm for both left and right. There is thus, *contra* MOHR (1967), no difference between the Glasgow skull and *H. niger* in relative premolar row length.

We can summarise this discussion as follows: both the Amsterdam and Glasgow skulls are females. Discriminant analysis (*not* based on size) excludes the Amsterdam skull from the ranges of female sable or roan antelopes; the same analysis does not exclude the Glasgow skull from being a sable antelope, but it is placed near the edge of the dispersion, not far from the Amsterdam skull. Both are at the low end of the size range for sable antelope, and show similar distinguishing features: horn cores medially flattened, and lacrimal bone very small. We are convinced they are genuine skulls of the extinct blaauwbok.

Both known blaauwbok skulls are female. This makes comparison with the two living species difficult; but there is enough evidence to state firmly that the species is more closely allied to the sable antelope, *Hippotragus niger*, than to the roan antelope, *H. equinus*. It is perhaps not surprising, then, that blaauwbok and roan antelopes were capable of being sympatric (KLEIN 1974), while *H. leucophaeus* and *H. niger* constituted a well-differentiated allopatric species pair.

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### References

- BOSSCHA ERDBRINK, D. P. B. (1988): *Protoryx* from three localities East of Marageh, N. W. Iran. Proc. Kon. Ned. Akad. Wetensch. B, **91**, 101–159.
- GROVES, C. P. (1983): A new subspecies of Sable Antelope, *Hippotragus niger* (Harris, 1838). Rev. Zool. Afr. **97**, 821–828.

- KLEIN, R. G. (1974): On the taxonomic status, distribution and ecology of the Blue Antelope; *Hippotragus leucophaeus* (Pallas, 1766). *Ann. S. Afr. Mus.* **65**, 99–143.
- MOHR, E. (1967): *Der Blaubock Hippotragus leucophaeus* (Pallas, 1766): Eine Dokumentation. Hamburg, Berlin: Verlag Paul Parey.
- ROOKMAAKER, L. C. (1992): Additions and revisions to the list of specimens of the extinct Blue Antelope (*Hippotragus leucophaeus*). *Ann. S. Afr. Mus.* **102**, 131–141.

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